



SEQUENCE LISTING

<110> Logemann, Juergen
Jach, Guido
Gornhardt, Birgit
Mundy, John
Schell, Jeff
Eckes, Peter
Chet, Ilan

<120> Transgenic pathogen-resistant organism

<130> A29542-FWC-I-R 070037.0195

<140> US 09/729,141

<141> 2000-12-01

<150> 08/812,025

<151> 1997-03-06

<150> 08/457,797

<151> 1995-06-01

<150> 08/134,416

<151> 1993-10-08

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<212> DNA

<213> Aspergillus giganteus

<220>

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Met Gln Glu Met

1

aga gcg cgg gtt ttg gcc aca tac aat ggc aaa tgc tac aag aag gat 105
Arg Ala Arg Val Leu Ala Thr Tyr Asn Gly Lys Cys Tyr Lys Lys Asp

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MAR 27 2003
TECH CENTER 1600/2900

| 5 | 10 | 15 | 20 | |
|--|-----|----|----|--|
| aat atc tgc aag tac aag gca cag agc ggc aag act gcc att tgc aag | 153 | | | |
| Asn Ile Cys Lys Tyr Lys Ala Gln Ser Gly Lys Thr Ala Ile Cys Lys | | | | |
| 25 30 35 | | | | |
| tgc tat gtc aaa aag tgc ccc cgc gac ggc gcg aaa tgc gag ttt gac | 201 | | | |
| Cys Tyr Val Lys Lys Cys Pro Arg Asp Gly Ala Lys Cys Glu Phe Asp | | | | |
| 40 45 50 | | | | |
| agc tac aag ggg aag tgc tac tgc tagacggtga gcgaagggac gaagtaggct | 255 | | | |
| Ser Tyr Lys Gly Lys Cys Tyr Cys | | | | |
| 55 60 | | | | |
| ggggggttatt ttactctgct | 275 | | | |

<210> 2
 <211> 60
 <212> PRT
 <213> *Aspergillus giganteus*

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| 1 5 10 15 |
| Tyr Lys Lys Asp Asn Ile Cys Lys Tyr Lys Ala Gln Ser Gly Lys Thr |
| 20 25 30 |
| Ala Ile Cys Lys Cys Tyr Val Lys Lys Cys Pro Arg Asp Gly Ala Lys |
| 35 40 45 |
| Cys Glu Phe Asp Ser Tyr Lys Gly Lys Cys Tyr Cys |
| 50 55 60 |

<210> 3
 <211> 51
 <212> PRT
 <213> *Aspergillus giganteus*

| |
|---|
| <400> 3 |
| Ala Thr Tyr Asn Gly Lys Cys Tyr Lys Lys Asp Asn Ile Cys Lys Tyr |
| 1 5 10 15 |
| Lys Ala Gln Ser Gly Lys Thr Ala Ile Cys Lys Cys Tyr Val Lys Lys |
| 20 25 30 |
| Cys Pro Arg Asp Gly Ala Lys Cys Glu Phe Asp Ser Tyr Lys Gly Lys |
| 35 40 45 |
| Cys Tyr Cys |
| 50 |

<210> 4
<211> 1032
<212> DNA
<213> Hordeum vulgare

<220>
<221> 5'UTR
<222> (1)...(42)

<221> CDS
<222> (43)...(885)

<221> 3'UTR
<222> (886)...(1032)
<223> 46 nucleotides at the 3' end not shown

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<222> (930)...(935)
<223> potential polyadenylation signal

<221> polyA_signal
<222> (963)...(976)
<223> potential polyadenylation signal

<221> polyA_signal
<222> (1002)...(1011)
<223> potential polyadenylation signal

<221> mat_peptide
<222> (46)...(886)

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Met Ala Ala Lys
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atg gcg aag aac gtg gac aag ccg ctc ttc acc gcg acg ttc aac gtc 102
Met Ala Lys Asn Val Asp Lys Pro Leu Phe Thr Ala Thr Phe Asn Val
5 10 15 20

cag gcc agc tcc gcc gac tac gcc acc ttc atc gcc ggc atc cgc aac 150
Gln Ala Ser Ser Ala Asp Tyr Ala Thr Phe Ile Ala Gly Ile Arg Asn
25 30 35

aag ctc cgc aac ccg gcg cac ttc tcc cac aac cgc ccc gtg ctg ccg 198
Lys Leu Arg Asn Pro Ala His Phe Ser His Asn Arg Pro Val Leu Pro
40 45 50

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ccg | gtc | gag | ccc | aac | gtc | ccg | ccg | agc | agg | tgg | ttc | cac | gtc | gtg | ctc | 246 |
| Pro | Val | Glu | Pro | Asn | Val | Pro | Pro | Ser | Arg | Trp | Phe | His | Val | Val | Leu | |
| | | 55 | | | | | 60 | | | | | 65 | | | | |
| aag | gcc | tcg | ccg | acc | agc | gcc | ggg | ctc | acg | ctg | gcc | att | cgg | gcg | gac | 294 |
| Lys | Ala | Ser | Pro | Thr | Ser | Ala | Gly | Leu | Thr | Leu | Ala | Ile | Arg | Ala | Asp | |
| | 70 | | | | | 75 | | | | | 80 | | | | | |
| aac | atc | tac | ctg | gag | ggc | ttc | aag | agc | agc | gac | ggc | acc | tgg | tgg | gag | 342 |
| Asn | Ile | Tyr | Leu | Glu | Gly | Phe | Lys | Ser | Ser | Asp | Gly | Thr | Trp | Trp | Glu | |
| | 85 | | | | 90 | | | | | 95 | | | | | 100 | |
| ctc | acc | ccg | ggc | ctc | atc | ccc | ggc | gcc | acc | tac | gtc | ggg | ttc | ggc | ggc | 390 |
| Leu | Thr | Pro | Gly | Leu | Ile | Pro | Gly | Ala | Thr | Tyr | Val | Gly | Phe | Gly | Gly | |
| | | | | 105 | | | | | 110 | | | | | 115 | | |
| acc | tac | cgc | gac | ctc | ctc | ggc | gac | acc | gac | aag | ctg | acc | aac | gtc | gct | 438 |
| Thr | Tyr | Arg | Asp | Leu | Leu | Gly | Asp | Thr | Asp | Lys | Leu | Thr | Asn | Val | Ala | |
| | | | 120 | | | | | 125 | | | | | 130 | | | |
| ctc | ggc | cgg | cag | cag | ctg | gcg | gac | gcg | gtg | acc | gcc | ctc | cac | ggg | cgc | 486 |
| Leu | Gly | Arg | Gln | Gln | Leu | Ala | Asp | Ala | Val | Thr | Ala | Leu | His | Gly | Arg | |
| | | 135 | | | | | 140 | | | | | 145 | | | | |
| acc | aag | gcc | gac | aag | ccg | tcc | ggc | ccg | aag | cag | cag | cag | gcg | agg | gag | 534 |
| Thr | Lys | Ala | Asp | Lys | Pro | Ser | Gly | Pro | Lys | Gln | Gln | Gln | Ala | Arg | Glu | |
| | 150 | | | | | 155 | | | | | 160 | | | | | |
| gcg | gtg | acg | acg | ctg | ctc | ctc | atg | gtg | aac | gag | gcc | acg | cgg | ttc | cag | 582 |
| Ala | Val | Thr | Thr | Leu | Leu | Leu | Met | Val | Asn | Glu | Ala | Thr | Arg | Phe | Gln | |
| | 165 | | | | 170 | | | | | 175 | | | | | 180 | |
| acg | gtg | tct | ggg | ttc | gtg | gcc | ggg | ttg | ctg | cac | ccc | aag | gcg | gtg | gag | 630 |
| Thr | Val | Ser | Gly | Phe | Val | Ala | Gly | Leu | Leu | His | Pro | Lys | Ala | Val | Glu | |
| | | | | 185 | | | | 190 | | | | | | 195 | | |
| aag | aag | agc | ggg | aag | atc | ggc | aat | gag | atg | aag | gcc | cag | gtg | aac | ggg | 678 |
| Lys | Lys | Ser | Gly | Lys | Ile | Gly | Asn | Glu | Met | Lys | Ala | Gln | Val | Asn | Gly | |
| | | | 200 | | | | | 205 | | | | | 210 | | | |
| tgg | cag | gac | ctg | tcc | gcg | gcg | ctg | ctg | aag | acg | gac | gtg | aag | cct | ccg | 726 |
| Trp | Gln | Asp | Leu | Ser | Ala | Ala | Leu | Leu | Lys | Thr | Asp | Val | Lys | Pro | Pro | |
| | | 215 | | | | | 220 | | | | | 225 | | | | |
| ccg | gga | aag | tcg | cca | gcg | aag | ttc | gcg | ccg | atc | gag | aag | atg | ggc | gtg | 774 |
| Pro | Gly | Lys | Ser | Pro | Ala | Lys | Phe | Ala | Pro | Ile | Glu | Lys | Met | Gly | Val | |
| | 230 | | | | | 235 | | | | | 240 | | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| agg | acg | gct | gta | cag | gcc | gcc | aac | acg | ctg | ggg | atc | ctg | ctg | ttc | gtg | 822 |
| Arg | Thr | Ala | Val | Gln | Ala | Ala | Asn | Thr | Leu | Gly | Ile | Leu | Leu | Phe | Val | |
| 245 | | | | | 250 | | | | | 255 | | | | | 260 | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gag | gtg | ccg | ggt | ggg | ttg | acg | gtg | gcc | aag | gcg | ctg | gag | ctg | ttc | cat | 870 |
| Glu | Val | Pro | Gly | Gly | Leu | Thr | Val | Ala | Lys | Ala | Leu | Glu | Leu | Phe | His | |
| | | | 265 | | | | | | 270 | | | | | 275 | | |

| | | | | | | | | | |
|-----|-----|-----|-----|-----|------------|------------|------------|------------|-----|
| gcg | agt | ggt | ggg | aaa | taggtagttt | tccaggtata | cctgcatggg | tagtgtaaaa | 925 |
| Ala | Ser | Gly | Gly | Lys | | | | | |
| | | | 280 | | | | | | |

| | | | | | | |
|-------------|------------|------------|------------|------------|------------|------|
| gtcgaataaaa | catgtcacag | agtgacggac | tgatataaat | aaataaataa | acgtgtcaca | 985 |
| gagttacata | taaacaaata | aataaataat | taaaaatgtc | cagttta | | 1032 |

<210> 5
 <211> 281
 <212> PRT
 <213> Hordeum vulgare

| | | | | | | | | | | | | | | | |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| <400> 5 | | | | | | | | | | | | | | | |
| Met | Ala | Ala | Lys | Met | Ala | Lys | Asn | Val | Asp | Lys | Pro | Leu | Phe | Thr | Ala |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Thr | Phe | Asn | Val | Gln | Ala | Ser | Ser | Ala | Asp | Tyr | Ala | Thr | Phe | Ile | Ala |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Gly | Ile | Arg | Asn | Lys | Leu | Arg | Asn | Pro | Ala | His | Phe | Ser | His | Asn | Arg |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Pro | Val | Leu | Pro | Pro | Val | Glu | Pro | Asn | Val | Pro | Pro | Ser | Arg | Trp | Phe |
| | 50 | | | | | 55 | | | | | 60 | | | | |
| His | Val | Val | Leu | Lys | Ala | Ser | Pro | Thr | Ser | Ala | Gly | Leu | Thr | Leu | Ala |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Ile | Arg | Ala | Asp | Asn | Ile | Tyr | Leu | Glu | Gly | Phe | Lys | Ser | Ser | Asp | Gly |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Thr | Trp | Trp | Glu | Leu | Thr | Pro | Gly | Leu | Ile | Pro | Gly | Ala | Thr | Tyr | Val |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Gly | Phe | Gly | Gly | Thr | Tyr | Arg | Asp | Leu | Leu | Gly | Asp | Thr | Asp | Lys | Leu |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Thr | Asn | Val | Ala | Leu | Gly | Arg | Gln | Gln | Leu | Ala | Asp | Ala | Val | Thr | Ala |
| | 130 | | | | | 135 | | | | | 140 | | | | |
| Leu | His | Gly | Arg | Thr | Lys | Ala | Asp | Lys | Pro | Ser | Gly | Pro | Lys | Gln | Gln |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |
| Gln | Ala | Arg | Glu | Ala | Val | Thr | Thr | Leu | Leu | Leu | Met | Val | Asn | Glu | Ala |
| | | | | 165 | | | | | 170 | | | | | 175 | |
| Thr | Arg | Phe | Gln | Thr | Val | Ser | Gly | Phe | Val | Ala | Gly | Leu | Leu | His | Pro |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Lys | Ala | Val | Glu | Lys | Lys | Ser | Gly | Lys | Ile | Gly | Asn | Glu | Met | Lys | Ala |
| | | 195 | | | | | 200 | | | | | 205 | | | |
| Gln | Val | Asn | Gly | Trp | Gln | Asp | Leu | Ser | Ala | Ala | Leu | Leu | Lys | Thr | Asp |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 210 | | 215 | | 220 | | | | | | | | | | | |
| Val | Lys | Pro | Pro | Pro | Gly | Lys | Ser | Pro | Ala | Lys | Phe | Ala | Pro | Ile | Glu |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 |
| Lys | Met | Gly | Val | Arg | Thr | Ala | Val | Gln | Ala | Ala | Asn | Thr | Leu | Gly | Ile |
| | | | | 245 | | | | | 250 | | | | | 255 | |
| Leu | Leu | Phe | Val | Glu | Val | Pro | Gly | Gly | Leu | Thr | Val | Ala | Lys | Ala | Leu |
| | | | 260 | | | | | 265 | | | | | 270 | | |
| Glu | Leu | Phe | His | Ala | Ser | Gly | Gly | Lys | | | | | | | |
| | | 275 | | | | | 280 | | | | | | | | |

<210> 6
 <211> 480
 <212> DNA
 <213> Hordeum vulgare

<220>
 <221> CDS
 <222> (1)...(351)
 <223> protein synthesis inhibitor (PSI), aminoterminaly
 incomplete protein from an incomplete PSI cDNA
 clone

<221> 3'UTR
 <222> (352)...(487)

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 <222> (404)...(409)
 <223> potential polyadenylation signal

<221> polyA_signal
 <222> (437)...(442)
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<221> polyA_signal
 <222> (445)...(450)
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 1 5 10 15

 acg gtg tcg ggg ttc gtg gcc ggg ctg ctg cac ccc aag gcg gtg gag 96
 Thr Val Ser Gly Phe Val Ala Gly Leu Leu His Pro Lys Ala Val Glu
 20 25 30

 aag aag agc ggg aag atc ggc aat gag atg aag gcc cag gtg aac ggg 144

Lys Lys Ser Gly Lys Ile Gly Asn Glu Met Lys Ala Gln Val Asn Gly
35 40 45

<210> 8
<211> 2329
<212> DNA
<213> *Serratia marcescens*

<220>
<221> misc_feature
<222> (1)...(2329)
<223> ChiS gene from plasmid pLChis from E.coli A5187

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atztatcttt ccttaataga aaattcacta tccttatttg tcatgttttc ttttatattat 120
atgaaaataa attcacgctt gctgaataaa acccagttga tagcgctctt gttttttgcgc 180
ctttttttatt tatagtactg aatgtacgcg gtgggaatga ttatttcgcc acgtggaaag 240
acgctgttgt tattttattga ttttaacctt cgcggaattat tgcggaattt ttctcgcttcg 300
gcaatgcata gcgacgatta actcttttat gtttatcctc tcggaataaa ggaatcagtt 360
atgcgcaaat ttaataaacc gctggtggcg ctggtgatcg gcagcacgct gtggtccgcg 420
gcgcaggccg ccgcgcggcg caagccgacc atcgccctggg gcaacaccaa gtctcgccatc 480
gttgaagttg accaggcggc taccgcttat aataatttgg tgaaggtaaa aaatgccgcc 540
gatgtttccg tctcctggaa tttatggaat ggcgacaccg gcacgacggc aaaagtttta 600
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accgccagtg accgccaccga aattgtggta gccgacaccg acggcagcca tttggcgccg 780
ttgaaagagc cgctgctgga aaagaataaa ccgtataaac agaactccgg caaagtggtc 840
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gcgcaaaacc tgaccacact gctgtacggc tttatcccga tctgcggcgg caatggcatc 960
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cagggcgcatc ctgacctgaa aatcctgccg tcgatcggcg gctggacgct gtccgacccg 1200
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accggcaccg ccaccggggc ggttaaaggc acctgggaga acggtatcgt ggactaccgc 1800
caaatcgccg gccagttcat gagcggcgag tggcagtata cctacgacgc cacggcgga 1860
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gtgcaggcta aaggcaagta cgtggttgat aagcagctgg gcggcctgtt ctctggggag 1980
atcgacgcgg ataacggcga tattctcaac agcatgaacg ccagcctggg caacagcgcc 2040
ggcgttcaat aatcggttgc agtggttgcc gggggatatc ctttcgcccc cggttttttc 2100


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gccgacgaaa gtttttttttac gccgcacaga ttgtggctct gccccgagca aaacgcgctc 2160
atcggactca cccttttggg taatccttca gcatttcctc ctgtctttaa cggcgatcac 2220
aaaaataacc gttcagatat tcatcattca gcaacaaagt tttggcgttt tttaacggag 2280
ttaaaaacca gtaagtttgt gagggtcaga ccaatgcgct aaaaatggg 2329

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<210> 9
<211> 1002
<212> DNA
<213> Hordeum vulgare

```

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<220>
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<222> (1)...(63)

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<221> CDS
<222> (64)...(861)
<223> 26 kD preprotein of chitinase (ChiG)

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<221> 3'UTR
<222> (862)...(1002)
<223> partial, 11 nucleotides at 3' end not shown

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<221> polyA_signal
<222> (905)...(910)
<223> potential polyadenylation site

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<221> sig_peptide
<222> (64)...(294)
<223> probable signal peptide

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<221> sig_peptide
<222> (298)...(312)
<223> probable signal peptide

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```

<221> sig_peptide
<222> (349)...(378)
<223> probable signal peptide

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```

<221> sig_peptide
<222> (466)...(588)
<223> probable signal peptide

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<221> sig_peptide
<222> (607)...(861)
<223> probable signal peptide

```

```

<221> mat_peptide
<222> (133)...(861)

```

<400> 9

| | | | | | | |
|-------------|-------------|-------------|-------------|-------------|------------|-----|
| cctacgacag | tagcgtaacg | gtaaacacccg | agtacgggtac | tctgtgctttt | gttggctcgc | 60 |
| aca atg aga | tcg ctc gcg | gtg gtg gtg | gcc gtg gta | gcc acg gtg | gcc | 108 |
| Met Arg Ser | Leu Ala Val | Val Val Val | Ala Val Val | Ala Thr Val | Ala | |
| 1 | 5 | | 10 | | 15 | |
| | | | | | | |
| atg gcc atc | ggc acg gcg | cgc ggc agc | gtg tcc tcc | atc gtc tcg | cgc | 156 |
| Met Ala Ile | Gly Thr Ala | Arg Gly Ser | Val Ser Ser | Ile Val Ser | Arg | |
| | 20 | | 25 | | 30 | |
| | | | | | | |
| gca cag ttt | gac cgc atg | ctt ctc cac | cgc aac gac | ggc gcc tgc | cag | 204 |
| Ala Gln Phe | Asp Arg Met | Leu Leu His | Arg Asn Asp | Gly Ala Cys | Gln | |
| | 35 | | 40 | | 45 | |
| | | | | | | |
| gcc aag ggc | ttc tac acc | tac gac gcc | ttc gtc gcc | gcc gca gcc | gcc | 252 |
| Ala Lys Gly | Phe Tyr Thr | Tyr Asp Ala | Phe Val Ala | Ala Ala Ala | Ala | |
| | 50 | | 55 | | 60 | |
| | | | | | | |
| ttc ccg ggc | ttc ggc acc | acc ggc agc | gcc gac gcc | cag aag cgc | gag | 300 |
| Phe Pro Gly | Phe Gly Thr | Thr Gly Ser | Ala Asp Ala | Gln Lys Arg | Glu | |
| | 65 | | 70 | | 75 | |
| | | | | | | |
| gtg gcc gcc | ttc cta gca | cag acc tcc | cac gag acc | acc gcc ggg | tgg | 348 |
| Val Ala Ala | Phe Leu Ala | Gln Thr Ser | His Glu Thr | Thr Gly Gly | Trp | |
| 80 | | 85 | | 90 | 95 | |
| | | | | | | |
| gcg act gca | ccg gac ggg | gcc ttc gcc | tgg ggc tac | tgc ttc aag | cag | 396 |
| Ala Thr Ala | Pro Asp Gly | Ala Phe Ala | Trp Gly Tyr | Cys Phe Lys | Gln | |
| | 100 | | 105 | | 110 | |
| | | | | | | |
| gaa cgt ggc | gcc tcc tcc | gac tac tgc | acc ccg agc | gca caa tgg | ccg | 444 |
| Glu Arg Gly | Ala Ser Ser | Asp Tyr Cys | Thr Pro Ser | Ala Gln Trp | Pro | |
| | 115 | | 120 | | 125 | |
| | | | | | | |
| tgc gcc ccc | ggg aag cgc | tac tac ggc | cgc ggc cca | atc cag ctc | tcc | 492 |
| Cys Ala Pro | Gly Lys Arg | Tyr Tyr Gly | Arg Gly Pro | Ile Gln Leu | Ser | |
| | 130 | | 135 | | 140 | |
| | | | | | | |
| cac aac tac | aac tat gga | cct gcc ggc | cgg gcc atc | ggg gtc gat | ctg | 540 |
| His Asn Tyr | Asn Tyr Gly | Pro Ala Gly | Arg Ala Ile | Gly Val Asp | Leu | |
| | 145 | | 150 | | 155 | |
| | | | | | | |
| ctg gcc aac | ccg gac ctg | gtg gcc acg | gac gcc act | gtg ggc ttt | aag | 588 |
| Leu Ala Asn | Pro Asp Leu | Val Ala Thr | Asp Ala Thr | Val Gly Phe | Lys | |
| 160 | | 165 | | 170 | 175 | |

| | |
|--|------|
| acg gcc atc tgg ttc tgg atg acg gcg cag ccg ccc aag cca tcg agc | 636 |
| Thr Ala Ile Trp Phe Trp Met Thr Ala Gln Pro Pro Lys Pro Ser Ser | |
| 180 185 190 | |
| | |
| cat gct gtg atc gcc ggc cag tgg agc ccg tca ggg gct gac cgg gcc | 684 |
| His Ala Val Ile Ala Gly Gln Trp Ser Pro Ser Gly Ala Asp Arg Ala | |
| 195 200 205 | |
| | |
| gca ggc cgg gtg ccc ggg ttt ggt gtg atc acc aac atc atc aac ggc | 732 |
| Ala Gly Arg Val Pro Gly Phe Gly Val Ile Thr Asn Ile Ile Asn Gly | |
| 210 215 220 | |
| | |
| ggg atc gag tgc ggt cac ggg cag gac agc cgc gtc gcc gat cga atc | 780 |
| Gly Ile Glu Cys Gly His Gly Gln Asp Ser Arg Val Ala Asp Arg Ile | |
| 225 230 235 | |
| | |
| ggg ttt tac aag cgc tac tgt gac atc ctc ggc gtt ggc tac ggc aac | 828 |
| Gly Phe Tyr Lys Arg Tyr Cys Asp Ile Leu Gly Val Gly Tyr Gly Asn | |
| 240 245 250 255 | |
| | |
| aac ctc gat tgc tac agc cag aga ccc ttc gcc taattaatta gtcattgtatt | 881 |
| Asn Leu Asp Cys Tyr Ser Gln Arg Pro Phe Ala | |
| 260 265 | |
| | |
| aatcttggcc ctccataaaa tacaataaga gcatcgtctc ctatctacat gctgtaagat | 941 |
| gtaactatgg taacctttta tggggaacat aacaaaggca tctcgtatag atgcttttgct | 1001 |
| a | 1002 |

<210> 10
 <211> 266
 <212> PRT
 <213> Hordeum vulgare

<400> 10

| | |
|---|--|
| Met Arg Ser Leu Ala Val Val Val Ala Val Val Ala Thr Val Ala Met | |
| 1 5 10 15 | |
| Ala Ile Gly Thr Ala Arg Gly Ser Val Ser Ser Ile Val Ser Arg Ala | |
| 20 25 30 | |
| Gln Phe Asp Arg Met Leu Leu His Arg Asn Asp Gly Ala Cys Gln Ala | |
| 35 40 45 | |
| Lys Gly Phe Tyr Thr Tyr Asp Ala Phe Val Ala Ala Ala Ala Ala Phe | |
| 50 55 60 | |
| Pro Gly Phe Gly Thr Thr Gly Ser Ala Asp Ala Gln Lys Arg Glu Val | |
| 65 70 75 80 | |
| Ala Ala Phe Leu Ala Gln Thr Ser His Glu Thr Thr Gly Gly Trp Ala | |
| 85 90 95 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Thr | Ala | Pro | Asp | Gly | Ala | Phe | Ala | Trp | Gly | Tyr | Cys | Phe | Lys | Gln | Glu |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Arg | Gly | Ala | Ser | Ser | Asp | Tyr | Cys | Thr | Pro | Ser | Ala | Gln | Trp | Pro | Cys |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Ala | Pro | Gly | Lys | Arg | Tyr | Tyr | Gly | Arg | Gly | Pro | Ile | Gln | Leu | Ser | His |
| | 130 | | | | | 135 | | | | | 140 | | | | |
| Asn | Tyr | Asn | Tyr | Gly | Pro | Ala | Gly | Arg | Ala | Ile | Gly | Val | Asp | Leu | Leu |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |
| Ala | Asn | Pro | Asp | Leu | Val | Ala | Thr | Asp | Ala | Thr | Val | Gly | Phe | Lys | Thr |
| | | | | 165 | | | | 170 | | | | | | 175 | |
| Ala | Ile | Trp | Phe | Trp | Met | Thr | Ala | Gln | Pro | Pro | Lys | Pro | Ser | Ser | His |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Ala | Val | Ile | Ala | Gly | Gln | Trp | Ser | Pro | Ser | Gly | Ala | Asp | Arg | Ala | Ala |
| | | 195 | | | | | 200 | | | | | 205 | | | |
| Gly | Arg | Val | Pro | Gly | Phe | Gly | Val | Ile | Thr | Asn | Ile | Ile | Asn | Gly | Gly |
| | 210 | | | | | 215 | | | | | 220 | | | | |
| Ile | Glu | Cys | Gly | His | Gly | Gln | Asp | Ser | Arg | Val | Ala | Asp | Arg | Ile | Gly |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 |
| Phe | Tyr | Lys | Arg | Tyr | Cys | Asp | Ile | Leu | Gly | Val | Gly | Tyr | Gly | Asn | Asn |
| | | | | 245 | | | | | 250 | | | | | 255 | |
| Leu | Asp | Cys | Tyr | Ser | Gln | Arg | Pro | Phe | Ala | | | | | | |
| | | | 260 | | | | | 265 | | | | | | | |

<210> 11
 <211> 1235
 <212> DNA
 <213> Hordeum vulgare

<220>
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 <222> (1)...(48)

 <221> CDS
 <222> (49)...(1050)
 <223> preprotein of the glucanase GluG

<221> 3'UTR
 <222> (1051)...(1235)
 <223> partial, 14 nucleotides at the 3' end not shown

<221> polyA_signal
 <222> (1083)...(1088)
 <223> potential polyadenylation signal

<221> polyA_signal
 <222> (1210)...(1215)
 <223> potential polyadenylation signal

<221> mat_peptide
<222> (133)...(1050)

<400> 11

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Met Ala Arg
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aaa gat gtt gcc tcc atg ttt gca gtt gct ctc ttc att gga gca ttc 105
Lys Asp Val Ala Ser Met Phe Ala Val Ala Leu Phe Ile Gly Ala Phe
5 10 15

gct gct gtt cct acg agt gtg cag tcc atc ggc gta tgc tac ggc gtg 153
Ala Ala Val Pro Thr Ser Val Gln Ser Ile Gly Val Cys Tyr Gly Val
20 25 30 35

atc ggc aac aac ctc ccc tcc cgg agc gac gtg gtg cag ctc tac agg 201
Ile Gly Asn Asn Leu Pro Ser Arg Ser Asp Val Val Gln Leu Tyr Arg
40 45 50

tcc aag ggc atc aac ggc atg cgc atc tac ttc gcc gac ggg cag gcc 249
Ser Lys Gly Ile Asn Gly Met Arg Ile Tyr Phe Ala Asp Gly Gln Ala
55 60 65

ctc tcg gcc gtc cgc aac tcc ggc atc ggc ctc atc ctc gac atc ggc 297
Leu Ser Ala Val Arg Asn Ser Gly Ile Gly Leu Ile Leu Asp Ile Gly
70 75 80

aac gac cag ctc gcc aac atc gcc gcc agc acc tcc aac gcg gcc tcc 345
Asn Asp Gln Leu Ala Asn Ile Ala Ala Ser Thr Ser Asn Ala Ala Ser
85 90 95

tgg gtc cag aac aac gtg cgg ccc tac tac cct gcc gtg aac atc aag 393
Trp Val Gln Asn Asn Val Arg Pro Tyr Tyr Pro Ala Val Asn Ile Lys
100 105 110 115

tac atc gcc gcc ggc aac gag gtg cag ggc ggc gcc acg cag agc atc 441
Tyr Ile Ala Ala Gly Asn Glu Val Gln Gly Gly Ala Thr Gln Ser Ile
120 125 130

ctg ccg gcc atg cgc aac ctc aac gcg gcc ctc tcc gcg gcg ggg ctc 489
Leu Pro Ala Met Arg Asn Leu Asn Ala Ala Leu Ser Ala Ala Gly Leu
135 140 145

ggc gcc atc aag gtg tcc acc tcc atc cgg ttc gac gag gtg gcc aac 537
Gly Ala Ile Lys Val Ser Thr Ser Ile Arg Phe Asp Glu Val Ala Asn
150 155 160

| | | | | | | | | | | | | | | | | | |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|------|
| tcc Ser | ttc Phe 165 | ccg Pro | ccc Pro | tcc Ser | gcc Ala | ggc Gly 170 | gtg Val | ttc Phe | aag Lys | aac Asn | gcc Ala 175 | tac Tyr | atg Met | acg Thr | gac Asp | 585 | |
| gtg Val 180 | gcc Ala | cgg Arg | ctc Leu | ctg Leu | gcg Ala 185 | agc Ser | acc Thr | ggc Gly | gcg Ala | ccg Pro 190 | ctg Leu | ctc Leu | gcc Ala | aac Asn | gtc Val 195 | 633 | |
| tac Tyr | ccc Pro | tac Tyr | ttc Phe | gcg Ala 200 | tac Tyr | cgt Arg | gac Asp | aac Asn | ccc Pro 205 | ggg Gly | agc Ser | atc Ile | age Ser | ctg Leu 210 | aac Asn | 681 | |
| tac Tyr | gcg Ala | acg Thr | ttc Phe 215 | cag Gln | ccg Pro | ggc Gly | acc Thr | acc Thr 220 | gtg Val | cgt Arg | gac Asp | cag Gln | aac Asn 225 | aac Asn | ggg Gly | 729 | |
| ctg Leu | acc Thr | tac Tyr 230 | acg Thr | tcc Ser | ctg Leu | ttc Phe | gac Asp 235 | gcg Ala | atg Met | gtg Val | gac Asp | gcc Ala 240 | gtg Val | tac Tyr | gcg Ala | 777 | |
| gcg Ala | ctg Leu 245 | gag Glu | aag Lys | gcc Ala | ggc Gly 250 | gcg Ala | ccg Pro | gcg Ala | gtg Val | aag Lys | gtg Val 255 | gtg Val | gtg Val | tcg Ser | gag Glu | 825 | |
| agc Ser 260 | ggg Gly | tgg Trp | ccg Pro | tcg Ser | gcg Ala 265 | ggc Gly | ggg Gly | ttt Phe | gcg Ala | gcg Ala 270 | tcg Ser | gcc Ala | ggc Gly | aat Asn | gcg Ala 275 | 873 | |
| cgg Arg | acg Thr | tac Tyr | aac Asn | cag Gln 280 | ggg Gly | ctg Leu | atc Ile | aac Asn | cac His 285 | gtc Val | ggc Gly | ggg Gly | ggc Gly | acg Thr 290 | ccc Pro | 921 | |
| aag Lys | aag Lys | cgg Arg | gag Glu 295 | gcg Ala | ctg Leu | gag Glu | acg Thr | tac Tyr 300 | atc Ile | ttc Phe | gcc Ala | atg Met | ttc Phe 305 | aac Asn | gag Glu | 969 | |
| aac Asn | cag Gln | aag Lys 310 | acc Thr | ggg Gly | gac Asp | gcc Ala | acg Thr 315 | gag Glu | agg Arg | agc Ser | ttc Phe 320 | ggg Gly | ctc Leu | ttc Phe | aac Asn | 1017 | |
| ccg Pro | gac Asp 325 | aag Lys | tcg Ser | ccg Pro | gca Ala | tac Tyr 330 | aac Asn | atc Ile | cag Gln | ttc Phe | tagtacgtgt | agctacctag | | | | 1070 | |
| ctcacataacc | taaataaata | | | | agctgcacgt | | | acgtacgtaa | | | tgcggcatcc | | | aagtgtaacg | | | 1130 |
| tagacacgta | cattcatcca | | | | tggaagagtg | | | caaccaagca | | | tgcgttaact | | | tcctggtgat | | | 1190 |
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<210> 12
 <211> 334
 <212> PRT
 <213> Hordeum vulgare

<400> 12

| | | | | | | | | | | | | | | | |
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| Met | Ala | Arg | Lys | Asp | Val | Ala | Ser | Met | Phe | Ala | Val | Ala | Leu | Phe | Ile |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Gly | Ala | Phe | Ala | Ala | Val | Pro | Thr | Ser | Val | Gln | Ser | Ile | Gly | Val | Cys |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Tyr | Gly | Val | Ile | Gly | Asn | Asn | Leu | Pro | Ser | Arg | Ser | Asp | Val | Val | Gln |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Leu | Tyr | Arg | Ser | Lys | Gly | Ile | Asn | Gly | Met | Arg | Ile | Tyr | Phe | Ala | Asp |
| | 50 | | | | | 55 | | | | | 60 | | | | |
| Gly | Gln | Ala | Leu | Ser | Ala | Val | Arg | Asn | Ser | Gly | Ile | Gly | Leu | Ile | Leu |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Asp | Ile | Gly | Asn | Asp | Gln | Leu | Ala | Asn | Ile | Ala | Ala | Ser | Thr | Ser | Asn |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Ala | Ala | Ser | Trp | Val | Gln | Asn | Asn | Val | Arg | Pro | Tyr | Tyr | Pro | Ala | Val |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Asn | Ile | Lys | Tyr | Ile | Ala | Ala | Gly | Asn | Glu | Val | Gln | Gly | Gly | Ala | Thr |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Gln | Ser | Ile | Leu | Pro | Ala | Met | Arg | Asn | Leu | Asn | Ala | Ala | Leu | Ser | Ala |
| | 130 | | | | | 135 | | | | | 140 | | | | |
| Ala | Gly | Leu | Gly | Ala | Ile | Lys | Val | Ser | Thr | Ser | Ile | Arg | Phe | Asp | Glu |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |
| Val | Ala | Asn | Ser | Phe | Pro | Pro | Ser | Ala | Gly | Val | Phe | Lys | Asn | Ala | Tyr |
| | | | | 165 | | | | | 170 | | | | | 175 | |
| Met | Thr | Asp | Val | Ala | Arg | Leu | Leu | Ala | Ser | Thr | Gly | Ala | Pro | Leu | Leu |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Ala | Asn | Val | Tyr | Pro | Tyr | Phe | Ala | Tyr | Arg | Asp | Asn | Pro | Gly | Ser | Ile |
| | | 195 | | | | | 200 | | | | | 205 | | | |
| Ser | Leu | Asn | Tyr | Ala | Thr | Phe | Gln | Pro | Gly | Thr | Thr | Val | Arg | Asp | Gln |
| | 210 | | | | | 215 | | | | | 220 | | | | |
| Asn | Asn | Gly | Leu | Thr | Tyr | Thr | Ser | Leu | Phe | Asp | Ala | Met | Val | Asp | Ala |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 |
| Val | Tyr | Ala | Ala | Leu | Glu | Lys | Ala | Gly | Ala | Pro | Ala | Val | Lys | Val | Val |
| | | | | 245 | | | | | 250 | | | | | 255 | |
| Val | Ser | Glu | Ser | Gly | Trp | Pro | Ser | Ala | Gly | Gly | Phe | Ala | Ala | Ser | Ala |
| | | | 260 | | | | | 265 | | | | | 270 | | |
| Gly | Asn | Ala | Arg | Thr | Tyr | Asn | Gln | Gly | Leu | Ile | Asn | His | Val | Gly | Gly |
| | | 275 | | | | | 280 | | | | | 285 | | | |
| Gly | Thr | Pro | Lys | Lys | Arg | Glu | Ala | Leu | Glu | Thr | Tyr | Ile | Phe | Ala | Met |
| | 290 | | | | | 295 | | | | | 300 | | | | |
| Phe | Asn | Glu | Asn | Gln | Lys | Thr | Gly | Asp | Ala | Thr | Glu | Arg | Ser | Phe | Gly |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 |
| Leu | Phe | Asn | Pro | Asp | Lys | Ser | Pro | Ala | Tyr | Asn | Ile | Gln | Phe | | |

325

330